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(56) Documents Cited
**GB 2083075 A GB 2009783 A GB 1461990 A
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(54) Lighting fuel gel.

(57) A lighting fuel, particularly for barbecues, comprises an organic flammable liquid, such as an alcohol and/or a C10 to C20 paraffin, mixed with fumed silica to a gel-like consistency. The fuel can contain a hydrocarbon or a resin as burning/wetting modifier and a spit inhibitor such as butyl, isoprene or natural rubber. The fuel may be kept in a compressible container having a nozzle.

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Fuel

This invention relates to a lighting fuel which can be used to assist in the lighting of fires, barbecues and the like. The invention is particularly directed towards a barbecue-lighting fuel although some of its properties do make it useful for lighting other solid fuel fires in domestic or industrial situations.

Previously, it has been known to use a flammable organic liquid such as a solvent to light barbecues and it has also been known to use solid fuel such as fire-lighters. The liquid is usually a paraffin based solvent and has the disadvantage that, being quite volatile, it very rapidly evaporates and burns with a high flame. A high flame effectively means that much of the heat of combustion is lost to atmosphere rather than being applied to the barbecue fuel which needs to be lit. Further, surplus solvent not landing on the charcoal can run away and be wasted. Solid "firelighter" style lighting fuel is better in this respect, although it does not coat or soak into the charcoal. Further, solid lighting fuel has the disadvantage that in order to make the solid block the paraffin solvent is usually combined with

other organic materials such as urea-formaldehyde resin or the like. These other products, are in themselves combustible and their products of combustion can, in many circumstances, be undesirable. For example, some of the combustion products of urea-formaldehyde resin can be carcinogenic and others can be unpleasant. Thus, if the user commences to cook before all traces of the solid fuel has been removed, food can be tainted and there can be a possible hazard to health.

It is an object of the present invention, therefore, to provide an improved lighting fuel wherein the above described disadvantages are reduced or minimised.

The invention provides a lighting fuel comprising a flammable organic liquid thickened with fumed silica.

In order to minimise the possibility of harmful combustion products the liquid is desirably a hydrocarbon. A mixture of liquids can be used.

The flammable organic liquid is desirably a C10 to C20 normal paraffin since it is an entirely aliphatic low smoke solvent. Alternatively a C10 to C13 normal paraffin can be used. Many other hydrocarbon liquids can be used. For example, a mixture of a paraffin and an alcohol can be used

The amount of silica added can be just sufficient to allow the

product to pour, but to cause it to adhere and not significantly drip from an article onto which it is poured. A desired consistency (viscosity) range is from 100 poise to 500 poise, preferably 150 poise. The fuel can be made sufficiently gel-like to allow it to be expelled by pressure from a nozzle but not to flow without agitation.

In order to slow down the burning of the fuel and also to improve the wetting properties of the fuel it is desirable to add a combustion modifier, such as a resin, preferably a hydrocarbon resin, or a rosin derivative. This modifier can be in a small percentage and desirably is chosen so as to have no undesirable combustion products. A suitable resin is ESCOREZ (RTM) 1102 manufactured by Exxon. This is desirably in the proportion of from 5 to 15% desirably 9%.

With some liquids and possible/resin mixtures, the lighting fuel has a tendency to spit during burning and as this is undesirable, it is useful if an inhibitor is added to the fuel to prevent such spitting. It is expected that many compounds will serve this purpose and prevent sudden hot spots and/or expandable small bodies of fuel which can heat suddenly and explode to cause the spitting. Such compounds may act by dispersing such concentrations, or by modifying the combustion process. A compound which we have found particular suitable for this purpose is a hydrocarbon rubber, in particular a butyl rubber.

The hydrocarbon rubber can be added in a range from 5 to 15% desirably 9%.

The fuel is desirably packaged in a squeezable container having a nozzle wherein the fuel can be expelled by pressure.

The invention will be described further, by way of example, with reference to the following example.

A preferred fuel of lighting fuel of the invention comprises the following ingredients.

Ingredient	Range %	Preferred %
C10 - C20 Normal Paraffin	65 - 92	79
Fumed Silica	3 - 10	5
Resin	5 - 15	9
Butyl Rubber (isoprene or isobutylene rubber)	0 - 10	7

All percentages by weight.

The lighting fuel of the invention is made by mixing the ingredients thoroughly and then metering them into bottles or comparable containers.

It will be seen that the consistency of the fuel is gel-like, having a viscosity of 150 poise, that is to say of the consistency of grease.

When poured or squeezed onto sticks or coals, of wood, charcoal or the like, the liquid forms a coating thereon of from 2 to 5mm in thickness and only drips if very excessive amounts of the fuel are applied. In the case of a bed of charcoal to form a barbecue by applying carefully it is possible for virtually all the fuel which contacts charcoal to be retained thereon, only relatively small amounts dripping to the undertray or similar support. Once lit the fuel burns slowly and evenly with no significant flaring which would cause flame and heat to be generated above the charcoal with loss of thermal efficiency. The flaming is slow and steady and ensures efficient heat transfer to the charcoal to raise it to its combustion temperature. The organic liquid content of the fuel will usually burn first. The modifier, being a more complex molecule, burns relatively slowly and continues to burn after consumption of the liquid, thus extending the burning time of the fuel.

Similarly, the liquid can be used to light coal and comparable fuels as well as wood fires and the like in either domestic or industrial conditions. In relation to the lighting of solid-fuel fired boilers either for domestic or industrial use, the use of

the liquid of the invention can replace conventional newspapers and sticks ignition, the gel-like nature of the compound causing it to adhere to the fuel burn easily in a lighting mode. It has all the advantages of conventional solid fire lighters but allowing, for example, easy application by means of a bottle or long spout container and allowing the fire to be laid well in advance and the lighting fuel applied or injected at a later stage and then lit when ignition is required.

As mentioned above, the preferred liquid is a C10 to C20 normal paraffin which being hydrocarbon has little or no oxygen content. Of course, the less oxygen content the better as there is less danger of a reaction upon burning which could give undesirable products. Any convenient organic flammable liquid can be used, for example a C10 to C13 normal paraffin is equally usable but clearly the product chosen must be relatively slow burning so as to avoid the danger of rapid burning or explosion and must be relatively cheap. A mixture of liquids, such as paraffin plus an alcohol could be used. When the modifier and/or inhibitor need to be used, the nature of the liquid and the modifier/inhibitor must be such that the or each of the latter can be dissolved by the liquid. Hence the liquid will usually need to be a solvent.

The fumed silica is made by treating and expanding silica to form porous bead-like bodies which can absorb liquids of all sorts and

which can be added to many liquids in order to cause them to become stiff or gel-like. Fumed silica is by no means the cheapest or best agent for thickening liquids, for example materials such as sodium alginate are far more effective in far smaller cheaper quantities. However, fumed silica has the tremendous advantage, in the present situation that it does not have any combustion product. There is no possibility of any component thereof reacting, during burning to form undesirable side products. The inert nature of fumed silica in these circumstances is a great advantage.

As the fumed silica is a fairly expensive ingredient it is desirable that it is used in as small a quantity as possible. In practice we have found that a minimum percentage of 3% of fumed silica is the minimum necessary to achieve a sufficient degree of thickening. Below this percentage the degree of thickening falls rapidly and the liquid simply tends to pour off any article upon which it contacts with the resultant disadvantage of a pure free flowing liquid which has been described. Using 5% of fumed silica a thick sticky gel is provided which, nevertheless, can be easily poured or squeezed from a nozzled container. Above 5% properties can be improved because the gel becomes even stickier and less likely to flow. Above 10% however, the cost of the fume silica becomes considerable and the liquid can become too thick to pour with problems of handling and use.

A desirable modifier to the mixture of liquid and silica can modify the burning and, additionally and desirably the wetting properties of the fuel. As regards the burning properties the modifier resin acts to slow down the rate of burning of the fuel by burning after the liquid has been consumed. The modifier also increases the wetting capacity of the fuel so as to increase its tendency to soak into and impregnate fuel such as charcoal. A desirable modifier is a resin or a rosin derivative, desirably flammable but having little or no element content other than carbon and hydrogen which might cause undesirable reaction to produce by-products. A preferred modifier is a hydrocarbon resin sold under the designation ESCOREZ (RTM) 1102 by Exxon Corp.

One problem we have found using the above fuel is that there is a tendency, with some combinations of ingredients for spitting to occur. The mechanism for this is not known, but it is undesirable as burning fuel can be projected for some distance. This is clearly undesirable in a barbecue situation. We have found that several inhibitors can be used in the fuel to suppress this tendency to spit, the most convenient and useful of which is butyl rubber. The particular butyl rubber used is an isoprene (isobutylene) rubber sold under the designation butyl 065 by Exxon Corp. This inhibitor can be used in the percentage range 0 to 10% (0% being when the combination does not have the spitting property) desirably at about 7%. Other inhibitors which could be effective in this area are natural rubber, and other

hydrocarbon rubbers.

As mentioned, the fuel of the invention is not limited to use in relation to barbecues, but the material can be used in any fire lighting situation. Any convenient organic liquid or solvent can be used and the burning and wetting property modifiers can be selected at will as can the inhibitor if this is necessary.

A colouring or pigment can be incorporated to give the desired colour of end product to suit customer requirements. Optionally or additionally a fragrance (0.01% to 5.0%) may be incorporated to impart the aroma of culinary herbs. Further optionally or additionally ground or crushed particulate dried culinary herbs (0.01% to 5.0%) may be incorporated to impart or to further augment the aroma or enhance the appearance.

Many variations are possible within the scope of the claims.

Claims

1. A lighting fuel comprising a flammable organic liquid thickened with fumed silica.
2. A fuel as claimed in claim 1, wherein the liquid is a hydrocarbon.
3. A fuel as claimed in claim 1 or 2 wherein the liquid is a solvent.
4. A fuel as claimed in claim 1, 2 or 3 wherein the liquid is a mixture.
5. A fuel as claimed in any preceding claim wherein the liquid is a paraffin in the C10 to C20 normal paraffin range.
6. A fuel as claimed in claim 5 wherein the paraffin is a C10 to C20 or a C10 to C13 normal paraffin.
7. A fuel as claimed in claim 4 wherein the liquid is a mixture of a paraffin and an alcohol.
8. A fuel as claimed in any preceding claim and containing a modifier to extend the combustion time of the fuel beyond that of the liquid alone.

9. A fuel as claimed in claim 8 wherein the modifier improves the wetting properties of the fuel.
10. A fuel as claimed in claim 8 or 9 wherein the modifier is a hydrocarbon.
11. A fuel as claimed in claim 8, 9 or 10 wherein the modifier is a resin.
12. A fuel as claimed in claim 8, 9 or 10 wherein the modifier is a rosin derivative.
13. A fuel as claimed in any of claims 8 to 12 wherein the modifier is added in a quantity ranging from 5% to 15% by weight of the fuel.
14. A fuel as claimed in any preceding claim and containing an inhibitor to reduce any tendency of the fuel to spit.
15. A fuel as claimed in claim 14, wherein the inhibitor is a rubber soluble in the liquid.
16. A fuel as claimed in claim 15 wherein the inhibitor is a butyl, isoprene or natural rubber.

17. A fuel as claimed in any preceding claim and being pourable.
18. A fuel as claimed in any of claims 1 to 16 and being only limitedly pourable but expellable from a nozzled container by pressure.
19. A fuel as claimed in any of claims 1 to 16 or claim 18 and within a compressible container having a nozzle.
20. A lighting fuel substantially as described with reference to the example.

Relevant Technical Fields

- (i) UK Cl (Ed.L) C5G (GEX)
(ii) Int Cl (Ed.5) C10L 7/00, 7/02, 7/04

Search Examiner
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Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-
1-20

(ii) ONLINE DATABASES ; WPI, CLAIMS

Categories of documents

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| <p>X: Document indicating lack of novelty or of inventive step.</p> <p>Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p>A: Document indicating technological background and/or state of the art.</p> | <p>P: Document published on or after the declared priority date but before the filing date of the present application.</p> <p>E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p>&: Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2083075 A (RECKITT & COLMAN PRODUCTS LTD) - see page 1 lines 71-93 and lines 102-108; Examples 1 and 2	1-6, 8, 17-19
X	GB 2009783 A (ENERGY AND MINERALS RESEARCH CO) - see page 3 lines 10-13 and lines 38-51, and page 4 lines 12-40	1-8, 10, 17, 18
X	GB 1461990 (LONZA) - see Claim 1 and page 1 lines 16-20	1, 3, 17, 18
X	GB 809259 (CABOT INC) - see page 1 lines 73-78 and page 3 lines 1-16	1-4, 7, 18, 19
X	WPI Abstract Accession No 79-09958B/06 and FR 2399478 (DEUTSCHE GOLD & SILBER) 06.04.79 (see abstract)	at least 1

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).